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Eric Wu

7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)
Naval Weapons Station Earle
Test and Evaluation Division (Code 403)
Highway 34
Colts Neck, NJ 07722-5000

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Qualification tests were performed to determine whether the in-service Sonobuoy Overpack and Sonobuoy Launch Container (SLC) could be utilized to contain properly dunnaged solid type hazardous materials weighing up to a gross weight of 37 pounds and 32 pounds, respectively. The tests were conducted in accordance with Performance Oriented Packaging (POP) requirements specified by the United Nations Recommendations on the Transportation of Dangerous Goods and the Department of Transportation's Title 49 CFR and the Final Rulings published in the Federal Register Volume 55 on 21 December 1990. The container has conformed to the POP performance requirements; i.e., the container successfully retained its contents throughout the specified tests.

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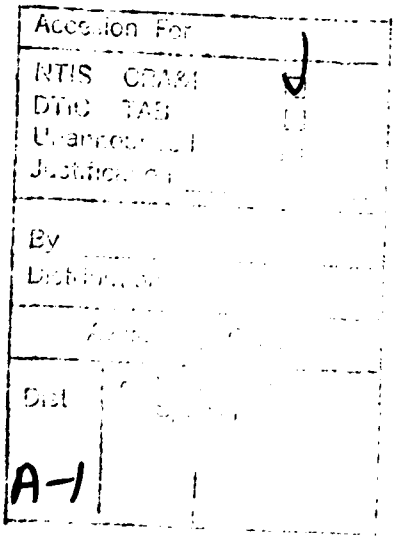
PERFORMANCE ORIENTED PACKAGING TESTING OF SONOBUOY OVERPACK CONTAINER AND SONOBUOY LAUNCH CONTAINER (SLC)

Author:
Eric Wu
Mechanical Engineer



Performing Activity:
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Test and Evaluation Division
Colts Neck, New Jersey 07722-5000

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INTRODUCTION

The Sonobuoy Overpack containing both the Sonobuoy Launch Container (SLC) and sonobuoy, had an overall weight of 42 pounds. The SLC, which serves as a launch canister and shipping/handling package for the aluminum sonobuoy, had an overall weight of 37 pounds. Performance Oriented Packaging (POP) test was performed to ascertain whether these standard containers (Packing Group II) would meet the requirements as specified by the United Nations Recommendation on the Transportation of Dangerous Goods Document, ST/SG/AC.10/1, Revision 6, Chapters 4 and 9. A base level vibration test was also conducted in accordance with the final rulings specified in the Department of Transportation's Performance Oriented Packaging Standards HM-181, and the Federal Register Volume 55. Due to unavailability, the number of containers used was less than the number required by the UN recommendation. This has been approved by the Under Secretary of Defense, Memorandum for the Joint Logistics Commanders dated 22 February 1990.

The objectives of these tests were to evaluate the adequacy of the container to minimize the risk to personnel or environmental exposure of the hazards associated with the contents in the advent of a transportation or handling accident.

TESTS PERFORMED

1. Base Level Vibration Test

This was performed in accordance with paragraph 178.608 of the Performance Oriented Packaging Standards Final Ruling published in the Federal Register, Vol. 55, No. 246, December 21, 1990. Two overpacks loaded with both the SLC and sonobuoy (lithium battery was removed and replaced with equivalent weight of sand), were placed on the repetitive shock platform. One overpack was placed standing on end and the second overpack was placed on its side. Both overpacks were restricted from leaving the table in all but the vertical direction. The frequency of the platform was increased until the containers left the platform 1/16 of an inch at some instant during each cycle. Test time was an hour at an input frequency of 3.83 Hz. (See figure 1.)

2. Stacking Test

This test was performed in accordance with ST/SG/AC.10/1, chapter 9, paragraph 9.7.6. Each container was subjected to a force applied to its top surface equivalent to the total weight of identical packages stacked to a height of 3 meters. Two sonobuoy packaging configurations were tested. The overpack stacking orientation was horizontal, and the SLC stacking was vertical.

a. Overpack (Two Containers Were Used). Two loaded overpacks used for the base level vibration test were used for this test. To facilitate application of the stacking weight, two additional overpacks were filled with sand and stacked on top of the two test overpacks. The two overpacks were then subjected to the required stacked weight of 1,344 pounds (672 pounds/container). (See figure 2.)

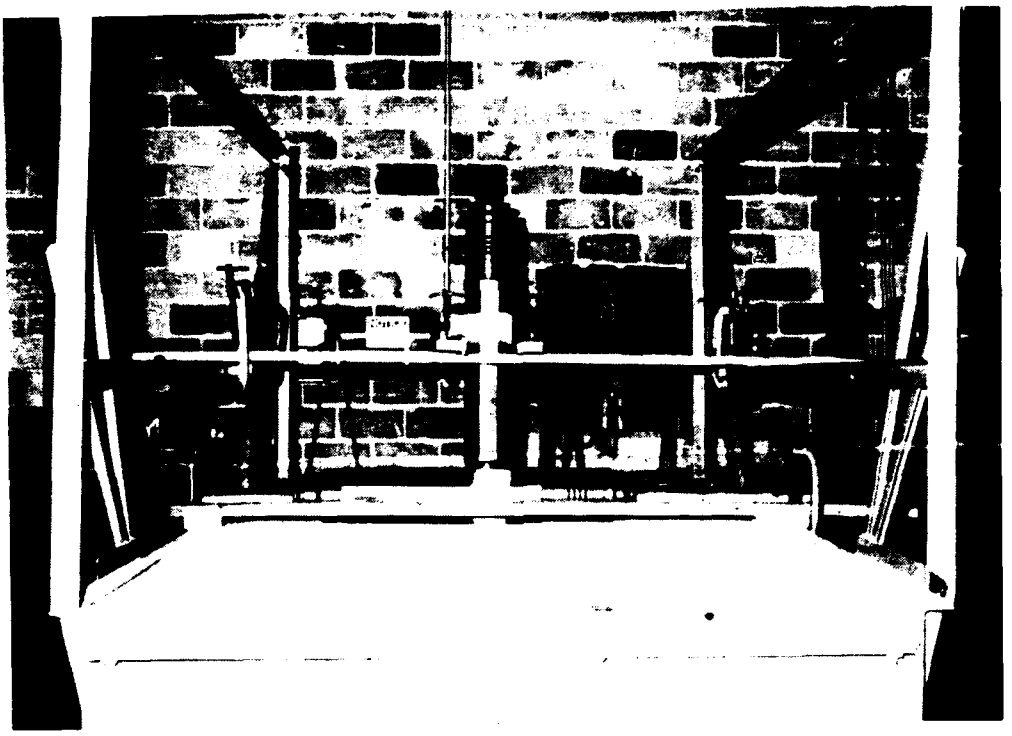

FIGURE 1
Base Level Vibration Test

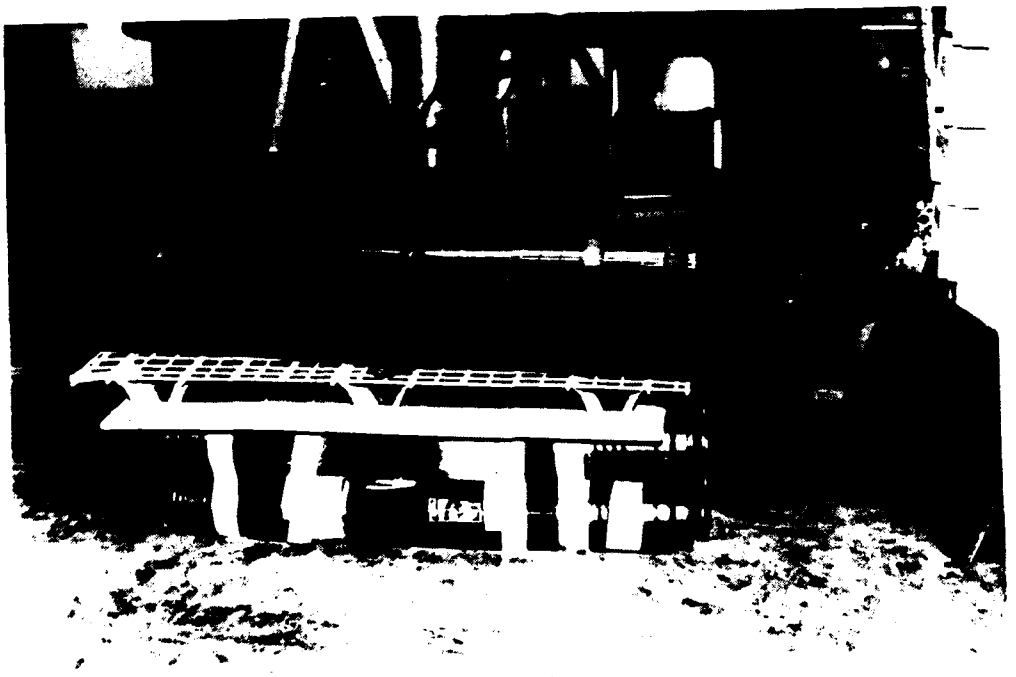

FIGURE 2
Sonobuoy Stacking Test

b. SLC (One Container Was Used). One SLC, the same SLC used throughout the test, was subjected to the required stacked weight of 74 pounds. (See figure 3.)

FIGURE 3
SLC Stacking Test

The test was performed for 24 hours. After the allowed time, the weight was removed and the containers were examined.

3. Drop Test

This test was performed in accordance with ST/SG/AC.10/1, chapter 9, paragraph 9.7.3. The drops were performed from a height of 4 feet at an ambient temperature of 70 ± 20 °F.

a. Overpack (three containers were used for each drop orientation)

(1) Horizontally. (See figure 4.)

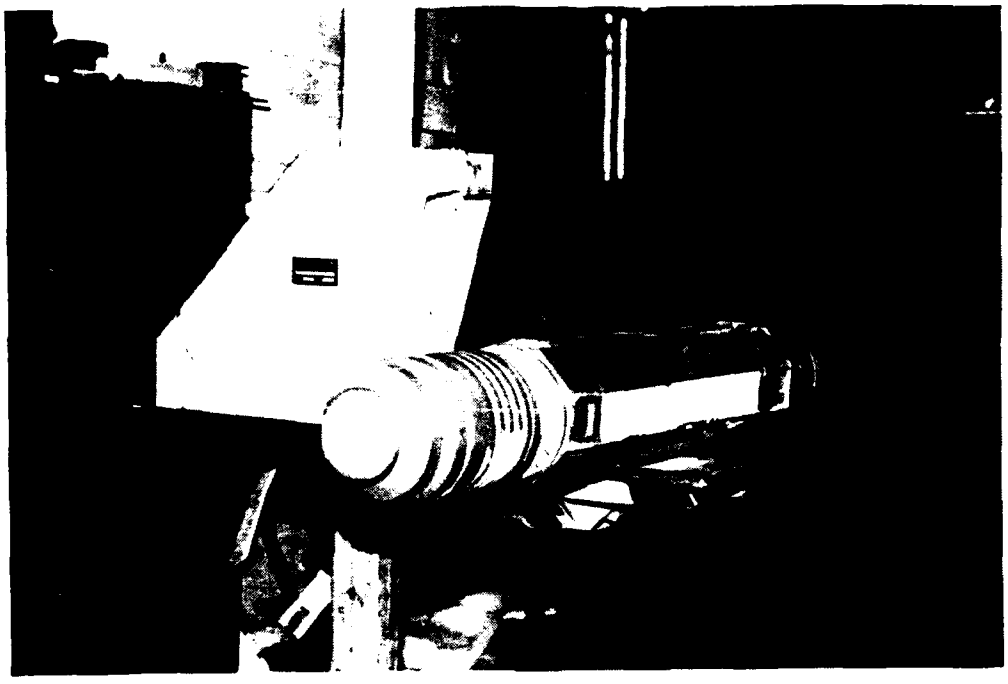

FIGURE 4
Sonobuoy Horizontal Drop

(2) Diagonally on the edge of the cover.

b. SLC (one container was used for each drop orientation)

(1) Horizontally. (See figure 5.)

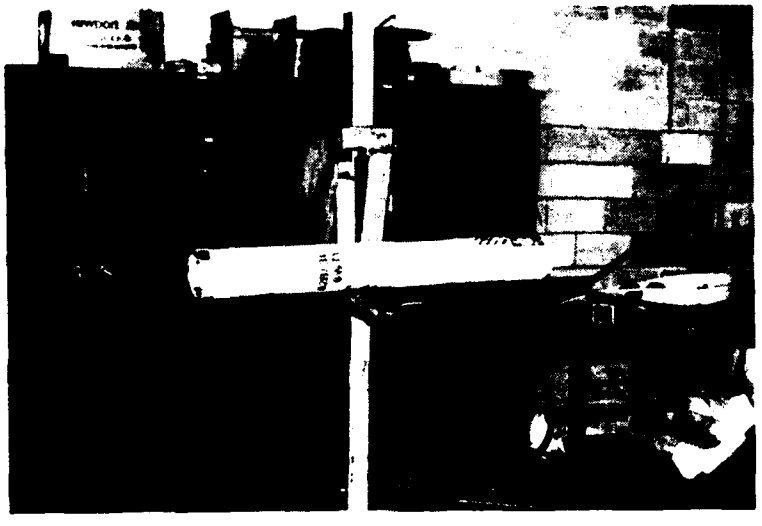

FIGURE 5
SLC Horizontal Drop

(2) Diagonally on the top edge of the SLC and the lid.

PASS/FAIL (UN CRITERIA)

1. **Base Level Vibration Test (Final Ruling Criteria)**

The criteria for passing the base level vibration test is outlined in paragraph 178.608 of the Title 49 CFR Final Ruling and states the following: "immediately following the period of vibration, each package shall be removed from the platform, turned on its side and observed for any evidence of leakage. Rupture or leakage from any of the packages constitutes failure of the test."

2. **Stacking Test (UN CRITERIA)**

The criteria for passing the stacking test is outlined in paragraph 9.7.6.3 of ST/SG/AC.10/1 and states the following: "... no test sample should leak ... No test sample should show any deterioration which could adversely affect transport safety or any distortion liable to reduce its strength or cause instability in stacks of packages."

3. **Drop Test (UN CRITERIA)**

The criteria for passing the drop test is outlined in paragraph 9.7.3.5 of ST/SG/AC.10/1 and states the following: "Where a packaging for solids undergoes a drop test and its upper face strikes the target, the test sample passes the test if the entire contents are retained by an inner packaging or inner receptacle; e.g., a plastic bag, even if the closure is no longer sift-proof. A slight discharge from the closure(s) upon impact should not be considered to be a failure of the packaging provided that no further leakage occurs.

TEST RESULTS

1. **Base Level Vibration Test**

Satisfactory.

2. **Stacking Test**

a. Satisfactory.

b. Satisfactory.

3. **Drop Test**

a. Satisfactory.

b. Satisfactory.

DISCUSSION

1. Base Level Vibration Test

Immediately after the vibration test was completed, each container was removed from the platform, turned on its side and observed for any evidence of leakage. There was no leakage to the containers as a result of this test.

2. Stacking Test

a. Each overpack was visibly checked after the 24-hour test period was over. There was no leakage, distortion, or deterioration to any of the containers as a result of this test.

b. The SLC was visibly checked after the 24-hour test period was over. There was no leakage, distortion, or deterioration to any of the containers as a result of this test.

3. Drop Test

a. After each drop, the overpacks were inspected for any damage which would be a cause for rejection. No damages or leakage was found after both horizontal and diagonal drops.

b. After each drop, the SLC was inspected for any damage which would be a cause for rejection. No damage or leakage was found after the horizontal drop. Although three of the four cover locking clips broke after the diagonal drop, the contents were retained. New clips will be required to replace the broken clips. The container remained intact and serviceable on completion of the tests.

REFERENCE MATERIAL

A. United Nation's "Recommendation on the Transportation of Dangerous Goods," ST/SG/AC.10/1, Revision 6

B. Performance Oriented Packaging Standards; Changes to Classification, Hazard Communication, Packaging and Handling Requirements Based on UN Standards and Agency Initiative; Final Rule, Federal Register, Vol. 55, No. 246 of December 21, 1990.

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TEST DATA SHEET

DATA SHEET: #1	
Container: Sonobuoy Overpack	
Type: 1H2	**UN Code:** See table 1
Specification Number:	**Material:** Plastic
Capacity: 19 kg (42 pounds)	**Dimensions:** 7" D x 45.125" L
Closure (Method/Type): Removable Cover	**Tare Weight:** 2.3 kg (5 pounds)
Additional Description:	
PRODUCT: See table	
Name: See table	
United Nations Number: See table	
United Nations Packing Group: II	
Physical State (Solid, Liquid, or Gas): Solid	
Vapor Pressure (Liquids Only): N/A	**At 50 °C:** N/A **At 55 °C:** N/A
Consistency/Viscosity: N/A	**Density/Specific Gravity:** N/A
Amount Per Container: 1	**Flash Point:** N/A
Net Weight: See table	
TEST PRODUCT: Simulated Weight of Sand	
Name: Sonobuoy Launch Container (SLC)	**Physical State:** Solid
Consistency: N/A	
Density/Specific Gravity: N/A	
Test Pressure (Liquids Only): N/A	
Amount Per Container: 1	**Gross Weight:** 7 kg (37 pounds)

TEST DATA SHEET

DATA SHEET #2	
Container: SLC	
Type: 1H2	**UN Code:** See table 1
Specification Number:	**Material:** Plastic
Capacity: 17 kg (37 pounds)	**Dimensions:** 5.375" D x 39.5" L
Closure (Method/Type): Removable Cover	**Tare Weight:** 2.3 kg (5 pounds)
Additional Description:	
PRODUCT: See table	
Name: See table	
United Nations Number: See table	
United Nations Packing Group: II	
Physical State (Solid, Liquid, or Gas): Solid	
Vapor Pressure (Liquids Only): N/A	**At 50 °C:** N/A **At 55 °C:** N/A
Consistency/Viscosity: N/A	**Density/Specific Gravity:** N/A
Amount Per Container: 1	**Flash Point:** N/A
Net Weight: See table	
TEST PRODUCT: Simulated Weight of Sand	
Name: Sonobuoy Inert	**Physical State:** Solid
Consistency: N/A	
Density/Specific Gravity: N/A	
Test Pressure (Liquids Only): N/A	
Amount Per Container: 1	**Gross Weight:** 14.5 Kg (32 pounds)

TABLE 1

NALC	NSN	Type	UN #	#/Cntr	Weight (kg)
8W59	6655-01-146-5008 6655-01-146-5009 6655-01-146-5010	AN/SSQ-36	0349	1	6.35
8W74	6655-01-327-9193 6655-01-327-9194 6655-01-328-1611	AN/SSQ-36	0349	1	7.2
8W62	5845-01-155-0151	AN/SSQ-53B	0349	1	13.0
8W72	5845-01-289-9058	AN/SSQ-53D	0349	1	10.8
8W70	5845-01-289-9059 thru 5845-01-289-9089	AN/SSQ-57B	0349	1	10.8
8W73	5845-01-257-0715 thru 5845-01-257-0745	AN/SSQ-57B	0349	1	9.9
8W71	5845-01-283-1361 thru 5845-01-283-1391	AN/SSQ-62B	0454	1	17.7
8W64 8W69	5845-01-255-6338	AN/SSQ-77A	0349	1	13.2
8W75	5845-01-327-9210	AN/SSQ-77CZ	0349	1	14.0
8W76	5845-01-327-9202	AN/SSQ-77B	0349	1	13.6

Packing drawing number for the AN/SSQ-62B is 1458AS202
All other buoys packing drawing number is 3065AS100